Claims

1. A method for forming conductive features in dielectric materials, comprising:

providing a dielectric layer;

forming a release layer over the dielectric layer;

defining a feature into the each of the release layer and the dielectric layer;

filling a conductive material over the release layer and into the feature; and

removing the release layer, the removing being configured to remove the conductive material from over the dielectric layer previously covered by the release layer.

2. A method for forming conductive features in dielectric materials as recited in claim 1, wherein the conductive material is applied in multiple layers.

3. A method for forming conductive features in dielectric materials as recited in claim 2, wherein the applying of the multiple layers includes,

applying a copper seed layer; and

applying a copper bulk material layer over the copper seed layer.

4. A method for forming conductive features in dielectric materials as recited in claim 2, wherein the applying of the multiple layers includes,

applying a barrier layer;

applying a copper seed layer over the barrier layer; and

applying a copper bulk material layer over the copper seed layer.

5. A method for forming conductive features in dielectric materials as recited in claim 1, wherein the removing of the release layer includes,

chemically dissolving the release layer.

6. A method for forming conductive features in dielectric materials as recited in claim 5, wherein the release layer is selected from one of an aluminum material, a polymer material, and a dissolvable material.

7. A method for forming conductive features in dielectric materials as recited in claim 5, wherein the dissolving includes wet etching.

8. A method for forming conductive features in dielectric materials as recited in claim 7, wherein the wet etching uses a combination of phosphoric acid, acetic acid and nitric acid, mixed with DI water.

9. A method for forming conductive features in dielectric materials as recited in claim 7, wherein the combination includes about 16 parts phosphoric acid, about 2 parts DI water, about 1 part acetic acid; and about 1 part nitric acid.

10. A method for forming conductive features in dielectric materials as recited in claim 7, wherein the wet etching uses one of a sodium hydroxide solution in DI water and a trisodium phosphate solution in DI water.

11. A method for electroplating copper interconnects in a dielectric layer, comprising:

forming a release layer over the dielectric layer;

patterning the release layer to form an exposed outline of a feature over the dielectric layer;

etching the dielectric layer in the exposed outline of the feature, the etching defined at least partially into the dielectric layer to define an etched feature;

blanket lining the release layer and the dielectric layer, the blanket lining covering the release layer and the etched feature;

applying a copper material over the blanket lining and into the etched feature; and

dissolving the release layer, the dissolving being configured to remove the blanket lining and the copper material from over the dielectric layer, while leaving the copper material in the etched feature.

12. A method for electroplating copper interconnects in a dielectric layer as recited in claim 11, wherein the blanket lining includes a barrier layer and a seed layer.

13. A method for electroplating copper interconnects in a dielectric layer as recited in claim 11, wherein the etched feature is one of a trench and a dual damascene structure.

14. A method for electroplating copper interconnects in a dielectric layer as recited in claim 11, wherein the release layer is selected from one of an aluminum material, a polymer material, and a dissolvable material.

15. A method for electroplating copper interconnects in a dielectric layer as recited in claim 11, wherein the dissolving includes wet etching.

16. A method for making copper features in a dielectric layer, comprising:

forming a release layer over the dielectric layer;

etching the release layer to define a location for a feature to be etched into the dielectric layer;

etching into the dielectric layer to define the feature in the dielectric layer;

applying a barrier layer over the release layer and into the feature;

applying a copper seed layer over the barrier layer;

apply a conformal dielectric layer over the copper seed layer;

directionally etching the conformal dielectric layer so as to remove the conformal dielectric layer from top surfaces of the dielectric layer, the top surfaces not including substantially vertical walls substantially in the feature defined in the dielectric layer, the directional etching exposing the copper seed layer over the top surfaces;

applying a copper material over the top surfaces so as to uniformly fill the feature and so as to apply the copper material throughout the dielectric layer in contact with the copper seed layer; and

removing the release layer, the removing of the release layer being configured to remove the barrier layer, the copper seed layer and the copper material from all regions other than in the feature.

17. A method for making copper features in a dielectric layer as recited in claim 16, wherein the release layer is selected from one of an aluminum material, a polymer material, and a dissolvable material.

18. A method for making copper features in a dielectric layer as recited in claim 16, wherein the removing the release layer may be accomplished by dissolving the release layer with a chemical.

19. A method for forming a conductive feature in a photo-sensitive dielectric material, comprising:

applying a photo-sensitive release layer over the photo-sensitive dielectric material;

exposing the photo-sensitive release layer and the photo-sensitive dielectric material so as to define a feature into the photo-sensitive dielectric material;

developing the photo-sensitive release layer and the photo-sensitive dielectric material so as to define the feature;

filling the feature with a conductive material; and

removing the release layer so as to remove the conductive material from over regions other than in the feature.

20. A method for forming a conductive feature in a photo-sensitive dielectric material as recited in claim 19, wherein the release layer is selected from one of an aluminum material, a polymer material, and a dissolvable material.

21. A method for forming a conductive feature in a photo-sensitive dielectric material as recited in claim 19, wherein the removing the release layer includes chemically dissolving the release layer.

22. A method for forming a conductive feature in a photo-sensitive dielectric material as recited in claim 21, wherein chemically dissolving the release layer includes wet etching with a combination of phosphoric acid, acetic acid and nitric acid, mixed with DI water.

23. A method for electroplating copper interconnects, comprising:

generating a stack including a first dielectric layer, a second dielectric layer and a release layer;

etching away a portion of the release layer and the second dielectric layer exposing a trench through to the first dielectric layer;

applying a barrier layer, a seed layer, and a conformal dielectric layer on the stack after the etching;

removing a portion of the conformal dielectric layer on horizontal surfaces of the stack;

plating copper onto the stack thereby filling the trench with the copper; and

removing the release layer, the removing detaches materials above the release layer from the stack.

24. A method for electroplating copper interconnects as recited in claim 23, wherein removing the release layer includes chemically dissolving the release layer.